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ABSTRACT

This automotive power flow system course sets the foundation in the theory of operation of the standard and automatic transmission, clutch assemblies, drive-line and rear axle assemblies. This is a one or two quinmester credit course covering 45 clock hours. In the fourth quinmester course in the tenth year, instruction consists of lectures, demonstrations and group discussions. Audiovisual aids are used to supplement instruction. Included is a course outline and eight pages of post tests. (DS)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

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V-34

Course Outline
AUTOMOTIVE MECHANICS 1 - 9043
(Automotive Power Flow System)
Department 48 - Quin 9043.04

CE001435

DADE COUNTY PUBLIC SCHOOLS
DIVISION OF INSTRUCTION • 1973

ED 092706

DADE COUNTY PUBLIC SCHOOLS
1450 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

Course Outline

AUTOMOTIVE MECHANICS 1 - 9043
(Automotive Power Flow System)

Department 48 - Quin 9043.04

county office of
VOCATIONAL AND ADULT EDUCATION

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Dade County Public Schools
Miami, Florida 33132

February, 1973

Published by the School Board of Dade County

Course Description

9043	48	9043.04	Automotive Power Flow System
State Category Number	County Dept. Number	County Course Number	Course Title

A foundation course in the theory of operation of the standard and automatic transmission, clutch assemblies, drive-line and rear axle assemblies. Demonstrations will be made by the instructor when necessary. This is a one or two quinmester credit course. Prior to entry into this course, the vocational student will display mastery of the skills indicated in Automotive Engines (9043.03).

Clock Hours: 45

PREFACE

The following pages contain a course outline entitled, "Automotive Power Flow System", course number 9043.04. This is the fourth quinmester course in the tenth year and is available to all students who satisfactorily complete "Automotive Engines", course number 9043.03.

This quinmester course is 45 hours in length and consists of seven blocks of instructions which are subdivided into several units each. It includes an introduction to the theory and functions of the units that make up the power flow system of the automobile. The instruction consists of lectures, demonstrations and group discussions. Audiovisual aids are used to supplement instruction. The students perform only minor disassembly and service as a group, with the instructor explaining the function of the parts as they are disassembled. The operating principles of the units and their relationship with the other vehicle systems will be explained.

The bibliography appearing on the last page of the outline lists several basic references along with supplementary references and audio-visual aids.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee and the Vocational Curriculum Materials Service, and has been approved by the Dade County Vocational Curriculum Committee.

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with Suggested Hourly Breakdown

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Power Flow Through the System	1
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Nomenclature	1
Function of Parts	1
Theory of Operations	1
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Nomenclature and Construction	1
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VIII. QUINMESTER POST TEST

APPENDIX: QUINMESTER POST-TEST SAMPLE 9

GOALS

The automotive mechanic trainee must be able to demonstrate:

1. An understanding of the function and theory of operation of the power flow system.

2. The ability to interpret the sectional drawings of the power flow units in the manufacturer's shop manuals and identify the major parts.

3. Attitudes which are acceptable to the automotive repair industry. These attitudes will be measured by the student's record of attendance, completion of assignments, and cooperation with instructors and fellow students.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - THE POWER FLOW SYSTEM

The student must be able to:

1. Identify the five assemblies that make up the power flow system.
2. Explain, in writing, the purpose of each assembly.
3. Trace the power flow through the power flow assemblies in the proper sequence.

BLOCK II - CLUTCH ASSEMBLIES

The student must be able to:

1. Identify the various types and classification of clutches.
2. Identify, in writing, the various parts of a clutch assembly working from a sectional view and an exploded view in a manufacturer's manual.
3. Demonstrate an understanding of the operation of the clutch assembly by successfully passing a written test.

BLOCK III - STANDARD TRANSMISSIONS

The student must be able to:

1. Identify, in writing, the various parts of a three-speed standard transmission assembly working from a sectional and an exploded view in a manufacturer's manual.
2. In writing, trace the power flow through the three-speed transmission in proper sequence through all gear shift positions.
3. Determine, in writing, the gear ratios in all gear shift positions, given the number of gear teeth in the transmission gears.
4. Demonstrate an understanding of the operation of the standard transmission assembly by successfully passing a written test.

BLOCK IV - AUTOMATIC TRANSMISSION

The student must be able to:

1. Identify, in writing, the parts of the torque conveyer working from an exploded and sectional view in a manufacturer's manual.
2. Demonstrate an understanding of the operation of a torque converter by successfully passing a written test.
3. Identify, in writing, the parts of a simple planetary gear system working from a sectional view and an exploded view in a manufacturer's manual.
4. Write a paragraph on the general purposes of the bands, clutches and other controls that are part of an automatic transmission.

BLOCK V - DRIVE LINES

The student must be able to:

1. Identify, orally, the various types of drive lines.
2. Identify, in writing, the various parts of a drive line working from an exploded view in a manufacturer's manual.
3. Demonstrate an understanding of the function and operation of the units that make up the drive line assembly by successfully passing a written test.

BLOCK VI - DIFFERENTIALS

The student must be able to:

1. Identify, in writing, the various parts of a differential assembly working from a sectional view and an exploded view in a manufacturer's manual.
2. Trace, in writing, the power flow through the differential parts in proper sequence.
3. Demonstrate an understanding of the function and operation of the differential assembly by successfully passing a written test.

BLOCK VII - REAR AXLES

The student must be able to:

1. Identify orally the various types of rear axles.
2. Identify, in writing, the various parts of the rear axle assembly working from a sectional view, or an exploded view in a manufacturer's manual.
3. Demonstrate an understanding of the construction and principles of operation of the rear axle assembly by successfully passing a written test.

Course Outline

AUTOMOTIVE MECHANICS 1 - 9043
(Automotive Power Flow System)

Department 48 - Quin 9043.04

I. THE POWER FLOW SYSTEM

A. Identification of Units
   1. Clutch assembly
   2. Transmission
   3. Drive line
   4. Differential
   5. Rear axle

B. Purpose of Each Unit

C. Power Flow Through the System

II. CLUTCH ASSEMBLIES

A. Types and Classifications
   1. Wet and dry
   2. Diaphragm and coil spring
   3. Single and multiple disc

B. Nomenclature

C. Function of parts
   1. Flywheel
   2. Pressure plate
   3. Friction disc
   4. Pilot bearing
   5. Release bearing
   6. Clutch fork

D. Theory of Operation

III. STANDARD TRANSMISSIONS

A. Types and Classification
   1. Synchromesh
   2. Constant mesh

B. Nomenclature and Construction

C. Function and Principles of Operation
   1. Gear train
      a. Gear ratios
      b. Multiplication of torque
      c. Speed reduction
   2. Synchronizers
   3. Bearings, lubrication and seals
   4. Shifting mechanisms

D. Overdrive

IV. AUTOMATIC TRANSMISSIONS

A. Fluid Couplings
   1. Principles of operation
   2. Function

B. Torque Converters
   1. Nomeclature and construction
      a. Pump
      b. Turbine
      c. Stator
   2. Torque multiplication

C. Planetary Gear Systems.
   1. Principles of operation
   2. Function
   3. Gear ratios

D. Transmis ion Control Devices
   1. Servo and band assemblies
   2. Clutches
   3. Vacuum operated controls
   4. Hydraulic operated controls
   5. Mechanical controls

V. DRIVE LINES

A. Types and Classification
   1. Torque tube drive
   2. Hotchkiss drive

B. Function

C. Nomenclature and Construction
   1. Propeller shaft
   2. Slip joints
   3. Universal joints

VI. DIFFERENTIALS

A. Types
   1. Standard
   2. Non-slip

B. Function

C. Nomenclature and Construction
   1. Drive pinion
   2. Ring gear
   3. Differential pinion
   4. Lubrication

VI. DIFFERENTIALS

D. Principles of Operation
   1. Gear ratio
   2. Differential action

VII. REAR AXLES

A. Types and Classification
   1. Full floating
   2. Semifloating
   3. Three-quarter floating
   4. Swing axles

B. Function

C. Nomenclature and Construction
   1. Axle shafts
   2. Bearings and seals

VIII. QUINMESTER POST-TEST

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Basic References:

1. Crouse, William H. Automotive Transmission and Power Trains. New York: Webster Division, McGraw-Hill Book Co., 1967. Pp. 626.

2. _____. Automotive Mechanics. 5th ed. New York: Webster Division, McGraw-Hill Book Company, 1965. Pp. 616.

Supplementary References:

3. Chilton Auto Repair Manual. 35th ed. Philadelphia: Chilton Company, 1964. Pp. 1250.

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5. Motors Auto Repair Manual. 27th ed. New York: Motor Magazine, 1964. Pp. 1280.

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7. _____. Auto Mechanics Fundamentals. Illinois: Goodheart-Willcox Company, Inc., 1969. Pp. 480.

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A P P E N D I X

Quinmester Post Test Sample

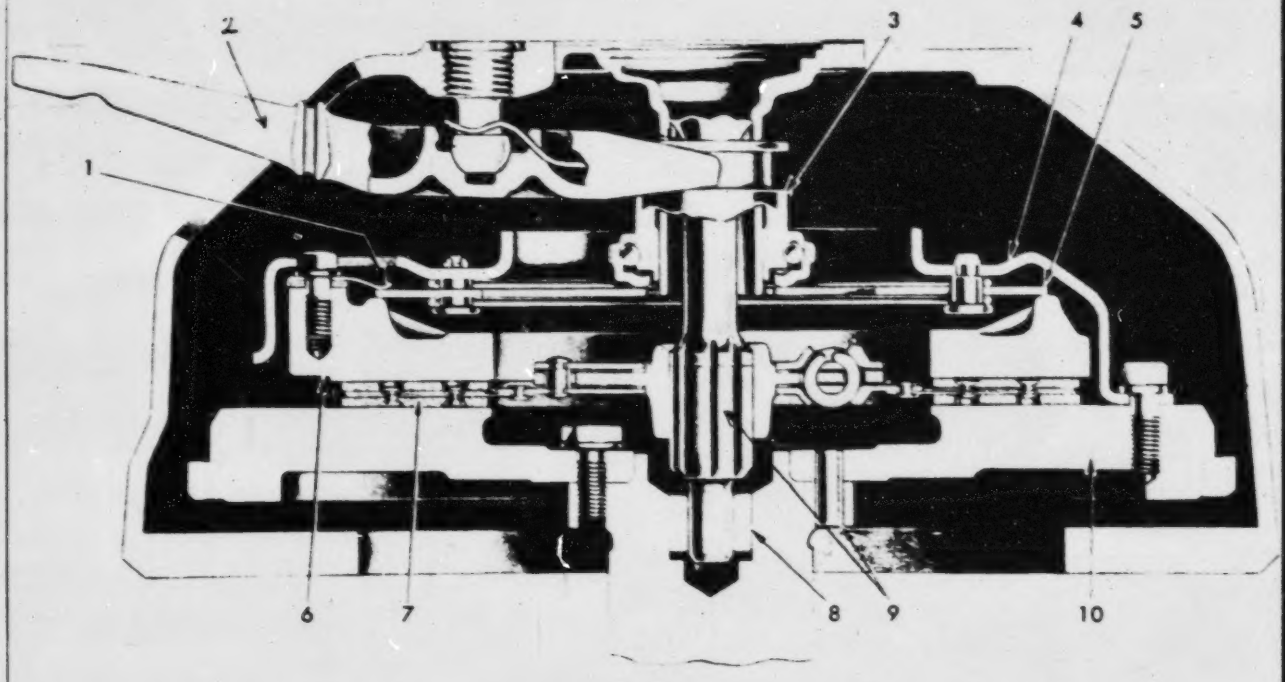
Quinmester Post-Test

Name _____ Date _____ Score ____

Identification Test

Clutch Sectional View

Directions - Illustrated below is a sectional view of a clutch assembly. In the spaces provided, write in the names of the parts identified by the numbers.



1. _____ 6. _____
2. _____ 7. _____
3. _____ 8. _____
4. _____ 9. _____
5. _____ 10. _____

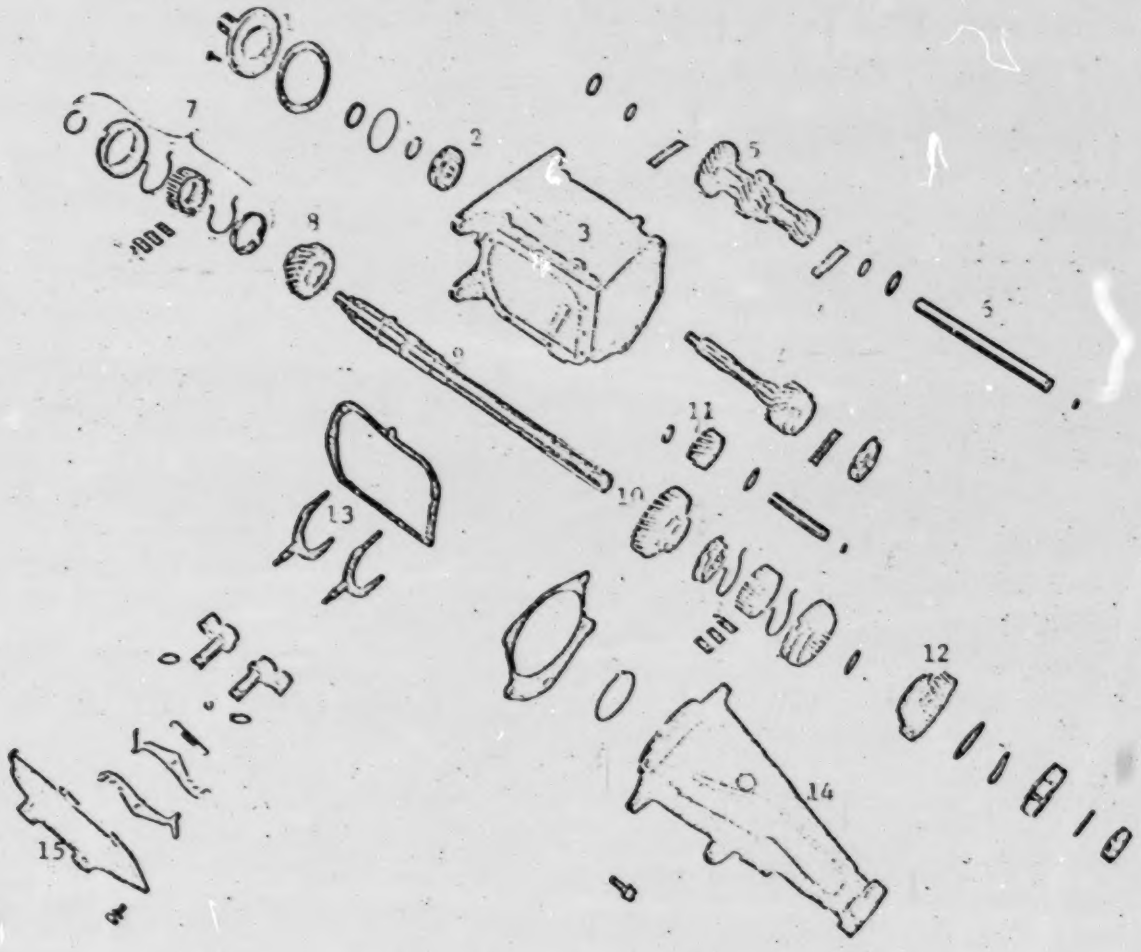
Quinmester Post-Test

Name _____ Date _____ Score ____

Identification Test

Transmission Exploded View

Directions - Illustrated below is an exploded view of a three-speed standard transmission. In the spaces provided, write in the names of the parts identified by the numbers.



1. _____ 6. _____ 11. _____
2. _____ 7. _____ 12. _____
3. _____ 8. _____ 13. _____
4. _____ 9. _____ 14. _____
5. _____ 10. _____ 15. _____

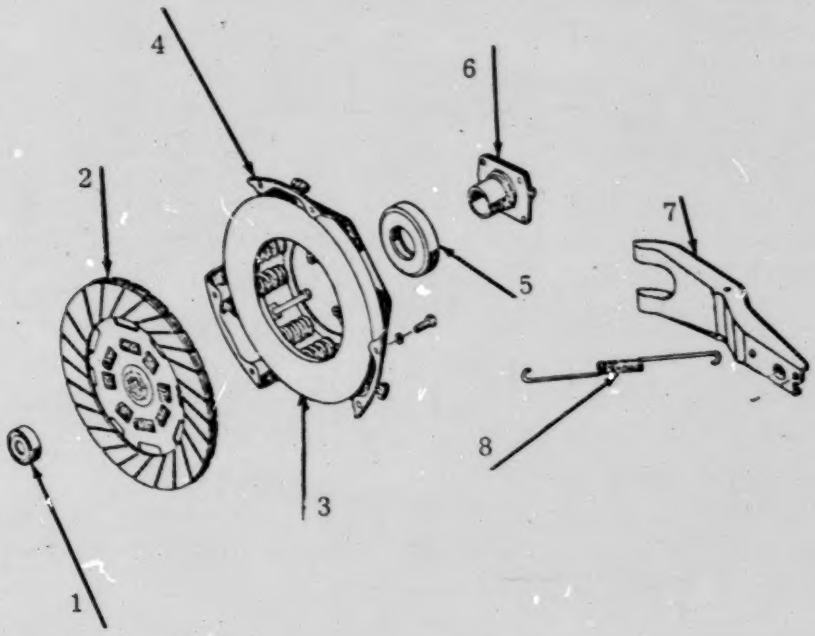
Quinmester Post-Test

Name _____ Date _____ Score ____

Identification Test

Clutch Exploded View

Directions - Illustrated below is an exploded view of a clutch assembly. In the spaces provided, write in the names of the parts identified by the numbers.



1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

4. _____ 8. _____

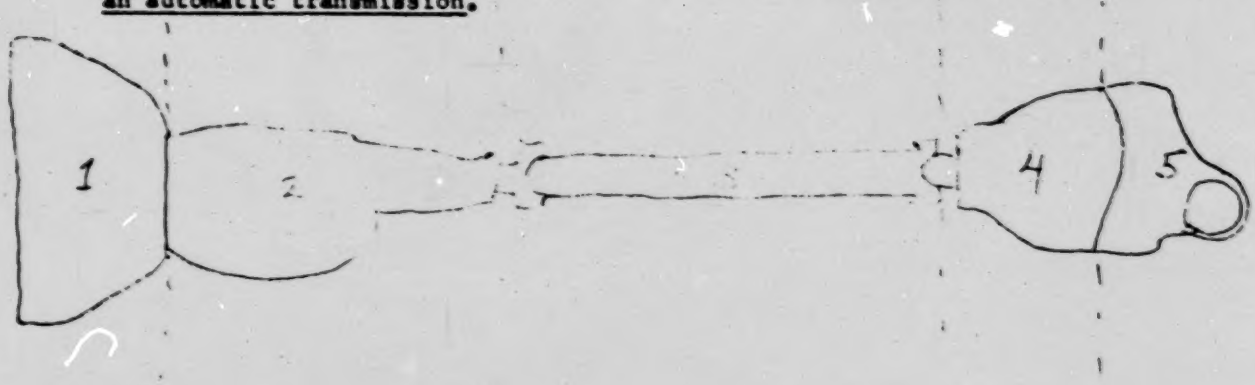
Quinmester Post-Test

Name _____ Date _____ Score ____

True-False Test

Power Flow System

Directions: Illustrated below is a drawing of an automatic power flow system. The system is made up of five major assemblies. Vertical lines separate the system into these five assemblies identified by numbers. In the space provided below, write in the correct name of these assemblies and answer the true or false questions relating to the function of these assemblies. Draw a circle around the T if the statement is true and around the F if the statement is false. The illustration does not have an automatic transmission.



1. No. 1 is a _____ assembly.
2. T F It balances the engine.
3. T F It allows the driver to disconnect the engine from the rest of the power flow system.
4. T F It must be used when shifting gears
5. T F It prevents the engine from overspeeding.
6. T F It is operated by a hand lever on the steering column.
7. T F It is cooled by water from the cooling system.

8. No. 2 is a _____ assembly.
9. T F It can be used to increase engine torque.
10. T F It is useful in starting the car from a dead stop.
11. T F It softens the ride of the car.
12. T F It slips it's gears when rounding a corner.
13. T F It is operated by a foot pedal.
14. T F It is lubricated by a heavy wheel bearing grease.

15. No. 3 is a _____ assembly.
16. T F It has a slip joint.
17. T F It has U joints.
18. T F It has U joints to allow the wheels to slip on a corner.
19. T F Its only purpose is to allow the car to back up.

20. No. 4 is a _____ assembly.

21. T F It has more than 4 gears inside.

22. T F It has no gears inside.

23. T F It is filled with water to keep it cool.

24. T F It allows the rear wheels to turn at different speeds.

25. T F It is operated by a foot pedal.

26. No. 5 is a _____ assembly.

27. T F It drives and supports the rear wheels.

28. T F It has gears at the outer ends to reduce the speed of the wheels.

29. T F It supports the weight of the vehicle.

30. T F The inner shaft has a bearing near the outer end and a gear on the inner end.

ANSWER KEY TO QUINMESTER POST-TEST

Clutch Sectional View

1. Retracting spring
2. Clutch fork
3. Release bearing
4. Clutch cover
5. Diaphragm spring
6. Pressure plate
7. Clutch disc
8. Pilot bearing
9. Input shaft
10. Flywheel

Clutch Exploded View

1. Pilot bearing
2. Clutch disc
3. Pressure plate
4. Clutch cover
5. Release bearing
6. Release bearing
7. Clutch fork
8. Pullback springs

Transmission Exploded View

1. Bearing retainer
2. Front bearing
3. Transmission case
4. Clutch gear (input shaft)
5. Countergear
6. Counter shaft
7. Synchronizer assembly
8. 2nd speed gear
9. Main shaft
10. 1st speed gear
11. Reverse idler gear
12. Reverse gear
13. Shift fork
14. Rear case extension
15. Side cover

Power Flow System

1. Clutch assembly
2. F
3. T
4. T
5. F
6. F
7. F
8. Transmission assembly
9. T
10. T
11. F
12. F
13. F
14. F
15. Driveline assembly
16. T
17. T
18. F
19. F
20. Differential assembly
21. T
22. F
23. F
24. T
25. F
26. Rear axle assembly
27. T
28. F
29. T
30. T